

I CLAIM:

Sub array

5 1. An antenna comprising:  
a substrate of dielectric material defining a longitudinal axis of the  
substrate and a surface of the substrate; and  
a plurality of electrically conductive elements disposed on the  
surface of the substrate to form a Yagi-Uda dipole array.

10 2. The antenna of claim 1 wherein the Yagi-Uda dipole array includes  
a driven element and [one or more parasitic elements] and electromagnetic  
energy is coupled from the driven element to the parasitic element through space  
and by surface waves in the substrate.

15 3. The antenna of claim 2, wherein the driven element comprises a  
dipole having [a first and a second dipole element extending colinearly in  
opposite directions from and perpendicular to the substrate axis, the dipole  
elements having adjacent ends spaced apart at equal distances on either side of  
the substrate axis.

20 4. The antenna of claim 2 wherein the parasitic elements include a  
reflector and one or more directors.

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5. The antenna of claim 2 comprising six or less directors.

6. The antenna of claim 4 comprising six directors.

7. The antenna of claim 3 wherein the reflector is disposed on one side of the driven element and the directors are disposed on the other side of the driven element.

8. The antenna of claim 6:  
wherein the driven element comprises a dipole having a first and a second dipole element extending colinearly in opposite directions from and perpendicular to the substrate axis, the dipole elements having adjacent ends spaced apart at equal distances on either side of the substrate axis; and  
wherein the reflector and directors extend linearly across, are centered upon, and oriented perpendicular to the substrate axis.

9. The antenna of claim 6 wherein:  
the length of the reflector is in the range of 1.08 to 1.3 times the length spanned between of the outer ends of the first and second dipole elements; and  
the length of the director is in the range of 0.8 to 0.95 times the length spanned between of the outer ends of the first and second dipole elements.

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10. The antenna of claim 8 wherein:  
the dipole, directors and reflector each respectively define a  
centerline thereof, and the antenna is adapted to broadcast a signal having a  
5 free space wavelength;

the distance between the center of the dipole and the center of the  
reflector is about 0.25 times free space wavelength; and

the distance between the center of the dipole and the center of the  
closest director and the spacing between adjacent directors is about 0.325 times  
10 free-space wavelength.

11. The antenna of claim 9 comprising one reflector and six directors.

12. The antenna of claim 10 wherein:

the dipole has an overall length of about 0.944 inches, with the  
inner ends spaced apart a distance of about 0.078 inches;

the reflector has a length of about 1.02 inches and has a center  
spaced about 0.51 inches from the dipole center;

the directors have a length of about 0.767 inches and have centers  
spaced from one another at a distance of about 0.614 inches, the director  
adjacent the dipole being spaced about 0.614 inches from the center of the  
dipole;

and one or more of the dipole, directors and reflector have a width  
25 extending parallel to the substrate axis of about 0.047 inches.

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13. An apparatus comprising:  
an antenna support; and  
an antenna mounted on the antenna support, the antenna  
5 comprising:  
a substrate of dielectric material defining a longitudinal axis of the  
substrate and a surface of the substrate; and  
an plurality of electrically conductive elements disposed on the  
surface of the substrate to form a Yagi-Uda dipole array.
- 10 14. The apparatus of claim 13 wherein the Yagi-Uda dipole array of the  
antenna includes a driven element and one or more parasitic elements, and  
electromagnetic energy is coupled from the driven element to the parasitic  
element through space and by surface waves in the substrate.
- 15 15. The apparatus of claim 13 wherein the antenna support is  
comprised of a dielectric material and is the substrate.
- 16 16. The apparatus of claim 13 wherein the apparatus is an electronic  
device for communicating through the antenna.
17. The apparatus of claim 13 wherein the antenna support is a printed  
circuit board of the apparatus.
- 25 18. The apparatus of claim 13 wherein the apparatus includes a  
PCMCIA card and the PCMCIA card includes the antenna support.

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19. The apparatus of claim 13 wherein the apparatus comprises a vehicle having a structure forming the antenna support.

20. The apparatus of claim 19 wherein the antenna support is an inside surface of a body panel of the vehicle.

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